TAB 9

Peter J. Patchin, MAI

Contaminated Properties and the Sales Comparison Approach

The market is slowly becoming accustomed to dealing with contaminated property. Properties formerly believed to be unmarketable are now beginning to sell, usually with a great deal of difficulty and with severe discounts. Proper analysis of this steadily increasing flow of market data can give appraisers another tool in the measurement of losses in value caused by contamination.

During the past decade market participants have become increasingly aware of contaminated property and its many problems. As the market has gained experience with environmentally impaired transactions, some of the panic has worn off and these properties have slowly begun to sell once again. Consequently, a small but steadily increasing body of market data concerning the sale of contaminated real estate is now developing.

The vast majority of market data observed so far has been associated with lightly to moderately contaminated properties. Sales of severely contaminated property, such as Superfund sites, while rare, do exist. Severely contaminated property sales are rare primarily because existing owners, perceiving an increased risk of liability, often do not want to relinquish control of these sites.

Appraisers can no longer dismiss the sales comparison approach simply by stating that contaminated properties are not marketable and that therefore there are no sales. While it is difficult to market environmentally impaired properties, they are being sold with increasing frequency as the market becomes more familiar with them.

This trend benefits the appraisal process in that it gives appraisers yet another tool in the measurement of losses in value resulting from contamination. Previous articles on valuation techniques for contaminated properties[1] focused on various

1. Peter J. Patchin, "Valuation of Contaminated Property," *The Appraisal Journal* (January 1988): 7–16; Peter J. Patchin, "Contaminated Properties—Stigma Revisited," *The Appraisal Journal* (April 1992): 167–172; Bill Mundy, "Stigma and Value," *The Appraisal Journal* (January 1992): 7–13; Bill Mundy, "The Impact of Hazardous Materials on Property Value," *The Appraisal Journal* (October 1992): 463–471; and Peter J. Patchin, "The Valuation of Contaminated Properties," *Real Estate Issues* (Fall/Winter 1990): 50–54.

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forms of income models. While income techniques are still valid and frequently provide the most accurate indication of value, the sales comparison approach now provides a valuable back-up for the income approach conclusions. The income methods have often been criticized for being theoretical in nature and for lacking direct contact with the market, particularly when losses in value caused by stigma factors are indicated. Now an appraiser may point to market sales that indicate that stigma is real and not simply a creation of some income model.

As yet there are few contaminated property sales. It is therefore seldom possible to run a sales comparison approach of contaminated sales with properties that would be comparable to a subject property on an unimpaired basis. It is frequently possible, however, to perform a sales comparison approach using sales in which the contamination is comparable or analogous to a subject property. It is the objective of this article to help appraisers recognize, assemble, and analyze these contaminated comparables.

HOW TO FIND MARKET DATA ON CONTAMINATED PROPERTIES

In the course of my work, I frequently take consulting assignments in urban areas located long distances from my local practice, and in which I have had little or no previous experience. I have consistently found that I am able to enter unfamiliar urban areas and develop at least a couple of contaminated sales within the first few days—sometimes to the chagrin of local appraisers who had told me that such data did not exist.

When local appraisers are questioned about the availability of contaminated property sale data in their area, the standard reply is that none exist. Further investigation usually reveals that such data are lying right under their noses, but they fail to recognize this. In most cases, a closer look at sales already in a local appraiser's files is a good beginning.

The problem is that appraisers have to educate themselves about what to look for as each new comparable comes across their desks, and before it goes into files. The following steps may help in this process.

- Be aware of the past uses of a property as well as its immediate neighborhood. If these past uses indicate the potential of contamination, set the sales aside for further investigation. Such uses may include wood preservative manufacturing (creosote or penta), bulk oil or gasoline terminals, insecticide manufacturing, electroplating, computer chip or printed circuit board manufacturing, coal gasification plants, sanitary landfills, machine shops with degreasing operations, chemical manufacturing or distribution, and dry cleaning operations.
- When confirming sales make it a practice to ask buyers, sellers, and brokers if the property was contaminated, and further, if this was an issue in the sale of the property.
- If a property was sold as contaminated, ask the seller or broker if there were purchase offers or agreements that did not go through because of the disclosure of contamination. This step frequently yields the data of the comparable most difficult to obtain—the value as unimpaired by contamination. If a property has been exposed for sale for a long time, it is quite likely that other brokers previously held the listing. Interviews with these brokers may reveal purchase agreements (offers) that failed because of the discovery of contamination. It must be emphasized that the deal that did not happen is often as important as the deal that did happen. Such advice may fly in the face of conventional appraisal wisdom, which downgrades the importance of purchase offers or failed purchase agreements. In these cases, however, such data can yield the best evidence of unimpaired value.
- Obtain a list of contaminated sites from the local state environmental agency. Such a list is frequently referred to as the "State Superfund List." These state lists generally include more properties for a particular state than would be found on the National Superfund List. Be aware of the extent and nature of

these contaminated areas. Newspaper articles are frequently good sources. Be watchful for sales that are located either on or in close proximity to these sites. It is important to interview the parties to these sales even if some other appraiser has already confirmed the sale for general purposes.

- If the selling price of a comparable sale appears to be inexplicably low, this may be an indication of an environmental impairment. For instance, an industrial building with an obvious unimpaired value in the range of $15 to $20 per square foot that is sold for $7 per square foot in what is otherwise a strong or stable market may signal environmental impairment. I am repeatedly appalled that so many appraisers enter such a sale into their files, or report it to their local appraisal data exchange, without further inquiry or comment.
- If you suspect contamination of a comparable, this may be confirmed with the local environmental agency. Usually a phone call identifying the property by owner's name and street address is sufficient to find if the property has an environmental record. Ask the environmental agency to send a copy of the record—this is public information.

Appraisers who follow these steps will develop a small but significant data bank of contaminated property sales. A reasonable expectation is a dozen or more such comparables (i.e., case studies) in a large urban area after a year of using these procedures.

ANALYSIS OF CONTAMINATED MARKET DATA

A written contaminated comparable tends to be lengthy, particularly when compared with normal, unimpaired comparables. Further, a contaminated comparable may not be comparable to a subject property in the normal valuation sense, but may be comparable only in its contamination problem. It is for this reason that our firm has the policy of calling contaminated comparables "case studies." The term case study acknowledges the lengthy nature of the data and also helps distinguish between such impaired comparables and the unimpaired comparable sales that may appear in the same appraisal report.

Once a sale of a contaminated property has been identified, a large volume of information must be assembled to make it into a reliable comparable. A contaminated sale involves far more data than a normal comparable sale. Some questions that must be answered are listed in the next section.

The extent and nature of contamination

- What types of hazardous materials are involved?
- Is there groundwater involvement, or can cleanup only be accomplished through removal/treatment of soils? This information can be of major importance. For instance, a gasoline spill that is remediated through soils removal generally results in little stigma after the cleanup. If groundwater is involved, however, many more unknowns are present and the resulting stigma may be severe.
- Who is responsible for paying cleanup and future monitoring costs? If the seller or other responsible party is under a consent order or indemnity agreement to pay for all of these costs, the decline in value may be attributable to stigma factors alone. This is particularly true when a seller or responsible party has a strong credit rating and is very likely to fulfill these obligations.
- If the buyer is responsible for all or part of the cleanup costs, what are those costs? Often, the costs estimated at the time of purchase and the ultimate cleanup costs are quite different.
- What is the time period estimated by remediation consultants for the cleanup to be completed? While this time estimate is often difficult for remediation experts to make, it is important for the appraisal process because it frequently indicates when the property may regain all or part of its mortgageability.
- Is it the intent of the cleanup to remediate to local public health rec-

ommended allowable limits (RAL)? Frequently, the local environmental protection agency (EPA) will permit a less thorough cleanup than RAL because they do not perceive any public health risk and the cleanup costs are far less. The dilemma is that although the lesser cleanup effort may satisfy the EPA, it may not satisfy the mortgage lenders, with the result that the property may never regain its mortgageability.

- Is the property under the supervision of the U.S. EPA or the state EPA? Is it on either the state or national Superfund list? If so, what is its hazardous ranking score (HRS)?

Evidence of unimpaired market value

- Some of the best evidence is a purchase agreement that failed because of the discovery of the contamination. Generally the only way to obtain this information is through interviews with buyers, sellers, brokers, and attorneys.
- Was there a previous sale of the property before discovery of the contamination?
- An appraisal of the property as unimpaired may exist. Typically the seller obtains such an appraisal before marketing the property.
- What is the assessor's market value? This may be productive in states where there are stringent requirements that assessors' market values be maintained close to actual market values.

Format of market data for an assembled case study

- What is required for court preparation? In general terms, the format should include the establishment of unimpaired value from a previous sale, a purchase offer prior to discovery of contamination, or an appraisal. The cost of remediation as well as the actual impaired selling price should be deducted.
- What does the remainder signify? It should be remembered that the remainder is an indication of value loss caused by stigma factors alone.
- How should stigma loss be accounted for? Generally, stigma loss should be expressed as a percentage of unimpaired value.

SAMPLE CASE STUDIES

A contaminated sale involves far more data than a normal comparable sale.

The following four case studies provide an idea of the format and information contained in a contaminated sale case study, and are included to illustrate the variations that may be encountered.

Contaminated case study property 1

The property is located in a large Midwestern city. The date of sale is P.A. February 1991, with closing in November 1991. The improvement was designed and constructed in 1985 as a supercomputer manufacturing plant. The plant was closed in the summer of 1989 when the parent company chose to not develop and produce supercomputers. The facility has a number of high-tech improvements that are costly to install, maintain, and operate. These include:

- Fiber optics cable system
- Computer cabling system
- 5,700 square feet of clean rooms, both class 5,000 and 10,000
- Computer floor—one entire wing (17,444 square feet)
- Electro-static discharge floors
- Compressed air system
- Central vacuum system
- Security system, including card-reader door
- Hazardous waste disposal system
- Wet process circuit-board printing system

The reported cost of the building, including these systems, was nearly $20 million in 1985. The property has been purchased with the intention of remodeling the existing building and constructing an additional 220,000-square-foot building. The property will be leased to a firm to serve as a computer operation center. The site area is 903,656 square feet, or 20.745 acres. The gross building area is 121,965 square feet.

The property was situated on a former coking oven site, which leached toxic contamination into the soils and groundwater. The site has been cleaned up and both the primary responsible party (PRP) and the surrounding municipality have

signed a consent order to pay for all future monitoring and cleanup costs.

The cleanup was first thought to be complete in 1982. In 1989, a small amount of groundwater contamination from the same source reappeared, and is currently being remediated.

Concerning its unimpaired value, in October 1989 a purchase agreement was signed by a large multinational company for $5.8 million in cash. Subsequently, this company canceled the purchase, stating that it did not wish to contend with any of the liabilities associated with the ownership of a contaminated property—even if the cleanup were fully indemnified by others.

Concerning the impaired value of the property, a large regional construction company, acting as a straw man for a major corporation future occupant, has purchased it. The buyer will remodel and expand the property and execute a long-term net lease to the major corporation user. The sale price is $4,300,000 cash.

Unimpaired sale price	$5,800,000
Impaired sale price	$4,300,000
Indicated stigma	$1,500,000
	or 25.9% of unimpaired value

The discount is entirely attributable to stigma value loss. The property cleanup has been completed and paid for. If any further cleanup or monitoring is ordered, it will be funded by PRP first. If the PRP fails to fund cleanup costs, the surrounding municipality will do so. The new buyer has two large, financially strong entities standing in front of it insofar as cleanup costs are concerned. Therefore, all of the value reduction must be attributed to stigma factors.

Contaminated case study property 2

Located in a large Midwestern city, with a sale date of October 4, 1990, this is an industrial, former chemical division property of a large multinational corporation. A complex of 16 buildings consisting of offices (14,175 square feet), engineering offices, warehouses, and manufacturing, its intended use is rental to multiple tenants. The site area is 256,280 square feet, or 5.88 acres, and the gross building area is 153,870 square feet.

The original building was constructed in 1931; additional buildings were constructed in the 1950s and the 1960s. Soil and groundwater contamination occurred during the years between 1947 and 1962. The chemical division of a multinational corporation was sold in the mid–1970s, and this property was part of the going-concern sale. The buyer was a large European conglomerate. Operations at this property were discontinued in the late 1980s for reasons unrelated to contamination.

The original owner had disposed of organics, solvents, and laboratory wastes from 1947 through 1962 onsite. In 1983 the site was tested and assigned an HRS of 39, which placed the property on the National Superfund List. A remedial action plan was submitted to the state EPA and pump-out of groundwater began in 1985. By 1991 the remediation was completed, with monitoring to continue indefinitely.

The assessor's unimpaired market value in 1990 was $1,780,000. This was in a state where the assessor was required to maintain values at not less than 90% of actual values; therefore, the assessor's market value was regarded as meaningful. In addition, there had been an unimpaired value appraisal prior to sale of $1,500,000, consisting of $700,000 in improvements and $800,000 for land.

When sold for its impaired value, the property was purchased by a local real estate developer who intended to convert the property into a multiple-tenant industrial facility. The intent was to provide low rental rates for smaller or newer business—thus making the property an "incubator" building. The purchase price was $95,000 cash.

Unimpaired value	$1,500,000
Impaired value	$ 95,000
Indicated stigma	$1,405,000
	or 93.7% of unimpaired value

The discount is entirely attributable to stigma value loss. The property cleanup has been completed by the former owner. If any further cleanup or monitoring is ordered by the U.S. EPA or state EPA, those costs will be paid for by the former owner first and the present owner (seller) second. The buyer has two Fortune 500 companies standing in front of it insofar as cleanup costs are concerned. Therefore, all of the value reduction must be attributed to stigma factors.

When interviewed, the buyer stated that he would not have considered purchasing the property if the cleanup had not been guaranteed by major credit concerns.

Contaminated case study property 3

The property is located in a large Midwestern city, and the sale closed September 19, 1991. The improvement was originally built in 1983 as a semiconductor facility. The plant was closed in 1987 when operations were consolidated out of state. The facility has several high-tech improvements that are extremely expensive to install, maintain, and operate. These include:

- 58,000 square feet of clean rooms
- 11,000 square feet of vibration-controlled, pneumatically supported lab floor
- Tight temperature and humidity controls
- Purity water system
- Electro-static discharge floors
- Compressed air system
- Central vacuum system
- Security system, including card-reader door
- Hazardous waste disposal system

The reported cost of the building, including these systems, was approximately $42 million in 1983. The property has been purchased with the intent to remodel the existing building into a computer operations center at a total cost of $32 million, including acquisition costs. The site area is 1,759,824 square feet, or 40.4 acres, and the gross building area is 248,332 square feet (not including 56,160 square feet of interstitial space above the laboratories).

During 1988 and 1989, it was discovered that the shallow groundwater aquifer was contaminated with TCE. In October 1989, a groundwater recovery and treatment system began operating. The estimated period of remediation was five years.

The unimpaired value is $9,200,000, from an appraisal before discovery of contamination that was used as a basis of settlement of a property tax appeal.

The impaired value is $6,515,345 (including $400,000 escrow for possible building contamination expense). The buyer was a major national corporation that chose to finance property through corporate bonds rather than mortgage. The buyer's national headquarters was also located in the same neighborhood.

Unimpaired value	$9,200,000
Actual selling price	$6,515,345
Indicated stigma	$2,684,655 or 29.2% of unimpaired value

The discount is entirely attributable to stigma value loss. Property cleanup is being funded by the seller. Once the cleanup is accomplished, monitoring and any required additional cleanup will also be funded by the seller. Therefore, the value reduction must be attributable to stigma factors.

Contaminated case study property 3A

Also in a large Midwestern city, the adjoining case study property 3A is currently being offered (see case study 3). This property consists of unimproved land, zoned light industrial, that adjoins case study property 3 on the south side. The site has sewer, water, and storm sewer services. The frontage is a major four-lane arterial road approximately one block from an interchange onto an interstate freeway. Subsoils are solid and suitable for building purposes. The site area is 81 acres.

This site was contaminated from the same source as case study 3. The unimpaired value of the site was at issue before the contamination was discovered. The assessor had valued the site at $100,000 per acre. Upon appeal by the owner, a value of $60,000 per acre was settled on. The owner had an appraisal for $60,000 per acre at the time. In late 1990, the owner, a large corporation, declared the site as surplus and listed it for sale, as impaired, at an asking price of $1.5 million, or $18,515 per acre. The site has now been listed for sale for over two years, with a major real estate firm handling the listing, using large onsite signs. At the time this article was written, no offers had been received.

Unimpaired value	$60,000 per acre
Impaired value	$18,815 per acre
Indicated stigma	$41,482 per acre or *at least* 69% of unimpaired value

The principle of substitution plays a major role in the amount of stigma value loss.

The same party is responsible for cleanup as for case study 3. Consequently, the entire indicated value loss is caused by stigma. The wide disparity between case study 3 (29% stigma) and case study 3A (69% stigma) is apparent in spite of the fact that they are adjoining properties with the same source of contamination. The primary reason for the large disparity appears to be the principle of substitution. Case study 3 was improved with an ultra high-tech building that had few substitutes; consequently, the buyer was willing to work with it as contaminated. Case study 3A, on the other hand, was bare land with many potential substitutes.

ANALYSIS OF CASE STUDIES

When an appraiser has assembled a group of contaminated case studies and reviews the results, there are generally a few conclusions that become readily apparent. For instance, the principle of substitution plays a major role in the amount of stigma value loss. Properties that are in demand and are hard to find in the market generally experience less stigma than those with many substitutes. Case studies 1 and 3 are examples of high-demand properties that experienced relatively low amounts of stigma. Few of these properties were on the market; consequently, the buyers felt compelled to work with them in spite of their contamination problems.

Often when an improved property has many alternative substitutes the prospective buyer is not compelled to work with the property. In these cases, contamination problems, similar to those found in case studies 1 and 3, will result in stigma losses as high as 60% to 70%.

Further, unimproved land generally suffers a greater stigma loss than improved property. This phenomenon is clearly illustrated by a comparison of case studies 3 and 3A. The primary causes of the greater vulnerability of unimproved land are twofold. First, the previously discussed principle of substitution is a significant cause. Second, most improved properties have an income stream or some type of value in use that tends to place a floor under its contaminated value, in spite of marketability or mortgageability problems. This income, or value in use, tends to mitigate the impact of stigma loss. Land parcels that are in extremely high demand or in short supply tend to exhibit less stigma. Once again, the principle of substitution asserts itself.

APPLICATION OF MARKET DATA TO THE APPRAISAL

Contaminated case studies (i.e., comparables) should not be held as comparable to a subject property in terms of physical characteristics or location. The comparability lies in the similarity of their contamination problems. The contamination case studies may be drawn from a widely diverse group of property types, but can still be applicable to a subject property for purposes of estimating its stigma value loss.

TABLE 1 Contaminated Case Study Summary

Case Study Number	Indicated Percentage of Unimpaired Value Lost to Stigma	Comparison to subject
1	25.9%	Contamination cleanup complete, stigma caused by fear of additional contamination. Less severe than subject.
2	93.7%	Superfund site. More severe than subject.
3	29.2%	Similar cleanup period of 4 years.
3A	69.0%	Vacant land site adjacent to case study 3, same source of contamination.
4	20.9%	No cleanup presently mandated—origin is mostly fuel oil. Less severe than subject.
5	45.4%	10-year cleanup period. More severe than subject. Consists of mostly vacant land.
6	35.5%	Site not actually contaminated itself, proximity to other contaminated property reflects pure stigma. Comparable to subject in terms of the mortgageability problems.
7	32.7%	Similar contamination and mortgageability problems.
8	62.5%	Similar contamination problems. Older property, many alternative substitutes in the market. On balance more severe than subject.

Table 1 provides an example of how contaminated market data may be applied in an appraisal. In this example, eight contaminated case studies were developed. The stigma value loss indicated by each of these case studies and their degree of comparability to the subject property's contamination situation is summarized in Table 1.

Comparisons of the contaminated case studies with the subject indicate:

- Case studies 1 and 4 show stigma value losses of 21% to 26% for situations less serious than the subject.
- Case studies 2, 5, and 8 show stigma value losses in the range of 45% to 94% for situations more serious than the subject.
- Case studies 3, 6, and 7 show stigma value losses ranging from 29.2% to 35.5% for situations similar to the subject. The average stigma loss indicated by these three case studies is 32.5%.

In sum, the results of the eight case studies appear to support approximately 30% to 35% stigma value loss. The stigma value loss thus indicated for the subject is:

Unimpaired value[2]	$1,000,000
	× 30% to 35%
Indicated stigma value loss	$300,000 to $350,000

CONCLUSION

The sales comparison approach for contaminated properties is now in its development stage. There appear to be sufficient data on sales of lightly to moderately contaminated properties to at least obtain an indication of a range of stigma value loss. While market data have not yet developed to the extent that this approach can be used as a primary indicator of value in most cases, it has already become useful as a confirming approach to value. As further market data develop, this method may well become the primary approach to valuation of contaminated properties.

2. This is as found by normal appraisal procedures.

TAB 10

Westlaw.
56 ARLR 295
56 Ark. L. Rev. 295
(Cite as: 56 Ark. L. Rev. 295)

Arkansas Law Review
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Article

*295 THE TRANSACTIONAL CHALLENGES POSED BY MOLD: RISK MANAGEMENT AND ALLOCATION ISSUES

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Table of Contents

***298** "Nature is wont to hide herself." [FN1]

I. INTRODUCTION

Mold has been an important part of this planet's ecosystem for millions of years. [FN2] The organisms recycle nature's resources by decomposing organic substances. [FN3] Regardless, it has until recently had a relatively low profile. [FN4] In fact, the average person's awareness of mold has probably been limited to a discolored shower curtain or stale bread. [FN5] Unfortunately, mold is no longer viewed by many as a benign nuisance.

The media has focused significant attention on mold over the past few years. [FN6] The organism has often been portrayed as a harmful indoor air pollutant. [FN7] Equally important, a number of ***299** individuals and groups have concluded that significant mold growth is present in a variety of structures. [FN8] They have a related perception that such growth may in some circumstances pose a threat to the occupants' health. [FN9] This concern is heightened by the fact that the average person spends 90% of his or her time indoors. [FN10]

Structural mold growth does not occur in a particular type of building or as a result of a certain use. [FN11] Instead, the likelihood of significant mold growth is tied to conditions that can be present in almost any structure. [FN12] It is, therefore, as likely to be found in a commercial structure as an industrial facility. [FN13] The potentially affected commercial structures have ranged from hotels [FN14] to office buildings. [FN15] There is similar interest in single- [FN16] ***300** and multi-family [FN17] residential structures. [FN18] Governmental facilities, such as schools [FN19] and courthouses, [FN20] have even been a focus of attention.

The presence of mold in structures is neither novel nor new. Biblical passages reference mold-infested dwellings. [FN21] The heightened concern about mold is probably due in part to some uncertainty about possible health effects associated with mold present in structures. Uncertainty generates fear. There is little disagreement that exposure to certain molds can, in some circumstances, adversely affect the health of a portion of the population. [FN22] Instead, there is significant debate as to the degree of the threat mold poses if present in a structure.

Whether mold constitutes a threat to structure occupants can involve difficult questions of causation. This is not a problem limited to mold. Determining what concentration of a particular environmental contaminant poses a threat to human ***301** health can be a complex exercise. Still, the establishment of acceptable mold concentrations or exposure limits will be especially challenging for two reasons. First, there are thousands of different species of mold. Second, each individual's sensitivity to exposure to mold will vary.

Mold may also attract attention because it is found in structures that are not normally associated with environmental concerns. There is an assumption that a variety of commercial and industrial properties may have current or historical environmental issues. However, there has traditionally been a greater level of comfort that our homes, schools, or hospitals are free of environmental hazards. [FN23] The average person may be troubled to learn that mold may be present in structures occupied by more vulnerable individuals such as the young or ill. [FN24]

The scientific debate about the effect of exposure to structural mold is probably irrelevant to some extent. [FN25] Terms like "toxic mold" [FN26] are now routinely applied to these organisms. As a result, the perceived presence of significant quantities of mold ***302** has generated lawsuits by tenants, [FN27] employees, [FN28] and others. The targets of these lawsuits have included parties such as lessors, condominium associations, [FN29] and property/building managers. Likewise, mold-related issues [FN30] have led to actions against parties that insure, [FN31] design, construct, [FN32] and/or sell [FN33] structures. [FN34]

Equally important, the discovery of mold in a structure now potentially adds another dimension to some simple property damage claims. If water is involved, a bodily injury claim is more likely to be included in the damages alleged by lessees [FN35] or other structure occupants. [FN36] Similarly, the potential presence of ***303** mold in structures has complicated the insurance industry's attempts to underwrite, [FN37] cover, [FN38] and adjust [FN39]/process [FN40] claims associated with water damage. [FN41]

The interest and/or concern about structural mold is arguably having an impact on various aspects of the improved real property market. [FN42] In fact, the suspected presence of mold may now in some circumstances constitute an issue that is a potential material impediment in transactions involving buildings or structures. [FN43] Specifically, some or all of the parties to various transactions may need to assess the probability that the current ***304** or future presence of mold will generate liability issues and/or materially affect the structure's value. [FN44] The interested parties may include those buying, selling, [FN45] leasing, managing, [FN46] financing, [FN47] designing, constructing, [FN48] or insuring various structures. [FN49]

The problem posed by mold and other environmental issues in the transactional context is their tendency to generate uncertainty. [FN50] Such uncertainty may hinder the parties' efforts to assign values to relevant structures. As a result, some

effort may be required to quantify the potential liabilities associated with a particular issue. This can be a transactional impediment in some circumstances.

The elimination of mold as a material issue in a particular transaction may depend upon the ease with which the improved real property market can develop, understand, and employ risk ***305** management mechanisms that address these warranties. [FN51] The mechanisms employed to cover potential environmental issues associated with a facility will likely be used to address mold risks. They may include insurance, [FN52] contractual allocation provisions, [FN53] and assessment/remediation activities. The ability of these mechanisms to address mold risks will probably vary.

Insurance will only be utilized to address mold risks if it is both available [FN54] and affordable. [FN55] The availability of cost-effective insurance to cover these risks is unclear. [FN56] The risks might also be addressed in the agreements documenting the transaction. [FN57] However, mold risks may prove more difficult to allocate because of the absence of clearly delineated standards ***306** or action levels. [FN58] Such standards are often used to clearly identify the events or conditions that trigger certain responsibilities.

Finally, assessments and/or remediation activities may be employed to delineate or achieve certain conditions. Still, the willingness of real property transactional parties to rely on these activities may depend upon their understanding of the various aspects of this issue. An enhanced understanding will enable the parties to routinely resolve mold issues in a given transaction. The market's familiarity with the techniques available to quantify mold impact on a transaction is unclear. [FN59] This is likely due in part to the absence of standardized techniques. [FN60]

An important objective of the real property market should be reduced uncertainty as to both techniques for preventing mold growth and the potential financial costs associated with mold when it does occur. [FN61] The market's relative unfamiliarity with both the organisms and effective ways to address them contributes to this uncertainty. [FN62] Lenders are unable to determine whether a loan transaction on a property will be profitable because they cannot quantify either the risk that mold will appear in the property (incidence of loss) or the resulting cost in the forms of liabilities and remediation costs (loss severity). [FN63] A property owner may be willing and able to tolerate some indeterminate risks, because he or she enjoys a significant upside potential from appreciation of the property over time. [FN64] Accepting such risks is more difficult for a lender that will receive a fixed return from a financing. [FN65]

***307** The employment of standardized risk management techniques and the education of the relevant parties in the market will hopefully eventually relegate mold to a standard item on the environmental due diligence list. For example, the emergence of mold prevention or management techniques that are widely recognized as effective would enable lenders to conclude that, if a borrower employs such techniques, the incidence of mold will be low. [FN66]

This may be a realistic goal. Several years ago, the presence of either asbestos or lead-based paint in a structure was viewed quite differently from a transactional standpoint. [FN67] There was confusion as to the appropriate response to these materials and associated costs/liabilities. [FN68] In contrast, the presence of either material in a structure is today typically viewed as simply one of a number of issues that should and generally can be quantified, [FN69] because there is greater consensus as to what are effective techniques for managing such materials and preventing them from becoming hazardous.

This article will focus on both the transactional challenge posed by mold and the associated risk management/allocation issues. To better understand the challenge posed by mold, Part II of this article provides an overview of the relevant characteristics of the organisms and the conditions necessary for growth. Part III examines, in some detail, the various assessment and remediation techniques. The limited government activity to date addressing mold is discussed in Part IV. Finally, Parts V and VI identify the aspects of mold that can potentially impede transactions and the risk management techniques that may be explored to address them.

***308** II. MOLD: THE RELEVANT CHARACTERISTICS

A. The Indoor Environment

The somewhat self-contained environment inside our structures can be complex. [FN70] A structure may contain a number of substances or contaminants that potentially constitute indoor air pollutants. [FN71] Problematic conditions are often denominated indoor air pollution. [FN72] A 2002 report issued by a State of Maryland task force stated that the factors

affecting indoor air quality include:

1. Ventilation rate, temperature, and humidity--factors directly determined by the heating, ventilation, and air conditioning ("HVAC") system.
2. Bioaerosols--which include molds, fungi, pollens, viruses, bacteria, animal dander, and other agents that are either living organisms or products derived from living organism.
3. Particulates--dusts, fibers, and other solid materials.
4. Volatile organic chemicals ("VOCs")--a large number of diverse chemicals with indoor and outdoor sources.
5. Chemicals produced by combustion that include carbon monoxide, nitrous oxides, sulfur oxides, and ozone. [FN73]

***309** The sources of some of the pollutants are varied. [FN74] They may originate in the outside environment and move inside. Equally important, they may be generated in the structure. [FN75]

An indoor air pollution problem has been stated to occur in a structure when three conditions are present: (1) "a contaminant source"; (2) "an occupant susceptible to exposure to the contaminant"; (3) "a transport mechanism that moves contaminants from the sources to the occupant." [FN76] The health effects potentially associated with indoor air pollutants may include irritation, headaches, fatigue, sinus congestion, allergic reactions, and asthma. [FN77]

Changes in our structures over the past few decades have made the presence of these conditions more likely. Prior to the development of HVAC systems, [FN78] windows and other building avenues to the outside environment were used for cooling and circulation. The 1973 Organization of Petroleum Exporting Companies oil embargo forced the United States to search for ways to conserve energy. [FN79] The possibility of reducing the energy used to heat and cool our structures and buildings became a key goal.

***310** The national response to the drive for a reduction in energy use included the construction or renovation [FN80] of buildings that were more self-contained [FN81] from an air circulation standpoint. [FN82] There was particular interest in a building's ventilation rate. [FN83] Various structural energy conservation techniques contributed to the retention of higher temperatures and humidity levels, decreased ventilation, [FN84] increased odor retention, [FN85] and concentration of indoor air contaminants. [FN86]

The conditions inside our structures have received limited regulatory attention from governmental environmental programs. [FN87] Rather, the primary focus has been on the outside environment. ***311**[FN88] Comprehensive federal [FN89] and state statutes and regulations have been in place for at least three decades that address pollutants in the ambient [FN90] air. [FN91] In contrast, the Federal Environmental Protection Agency's ("EPA") indoor air efforts have been focused on research and the dissemination of information. [FN92] Only the Federal Occupational Safety and Health Administration ("OSHA") directly regulates limited aspects of air quality inside a structure. [FN93] Similarly, the states do not generally ***312** have comprehensive environmental regulatory programs that address the indoor environment. [FN94]

The relative lack of regulatory attention on the indoor environment does not mean it is unimportant to public health. [FN95] On the contrary, the Federal EPA has stated that indoor air pollution is one of the top five environmental risks to human health. [FN96] An agency study found that structural indoor air problems contributed to employee absenteeism, [FN97] medical costs, [FN98] and reduced productivity. [FN99] Still, the type and concentrations of substances or organisms in a structure that pose a threat to human health can be a subject of disagreement. This debate has included mold.

B. Defining Mold

Mold is a member of the fungi kingdom. [FN100] Over 100,000 types of mold exist. [FN101] They are found throughout the indoor ***313** and outdoor environment. [FN102] In fact, mold organisms make up a significant percentage of the planet's biomass. [FN103] The kingdom's organisms do not have chlorophyll, and may be unicellular or multicellular.

Mold growth occurs through multi-cellular structures known as colony-forming units ("CFUs"). [FN104] The organisms reproduce and spread by airborne dispersal [FN105] of lightweight spores. [FN106] The spores will germinate if they have access to a food source. [FN107] The spores are generally responsible for the health effects associated with mold. [FN108]

Mold ranges in size from less than two to more than 200 microns. [FN109] Individual organisms are therefore invisible. [FN110] Mold becomes visible when individual structures or spores accumulate. [FN111]

C. The Presence of Mold in Structures

Few structures have sterile environments. Organisms such as mold and their associated spores are normally present to some degree in the indoor environment. [FN112] In fact, over 1000 species ***314** have been found in structures. [FN113] The organisms are present in the outdoor air that enters a building, or are spread by the structure's occupants, and can originate from contaminated structure materials and furnishings. [FN114] An important question is what types and/or amounts of mold in a structure pose a potential problem.

1. Types

Ten of thousands of species of mold are found throughout our environment. [FN115] However, there are certain species that receive a substantial amount of attention in the indoor context. These species may be deemed more problematic because of a concern that their presence poses a threat to health or is an indication that conditions are facilitating non-routine mold growth. Species that tend to attract attention in the indoor air context include Stachybotrys chartarum, [FN116] Penicillium, and Aspergillus. [FN117]

2. The Three Conditions Necessary for Growth

Mold will only grow if there is a suitable temperature and both a food source and moisture are available. [FN118] Growth can occur within twenty-four hours of the establishment of the necessary conditions. [FN119] This growth can occur at exponential rates. [FN120] However, eliminating any one of these required factors ***315** terminates growth. [FN121] The relative effectiveness of addressing one or more of these growth factors in the structural context is therefore an important question.

The temperatures found in most parts of a structure will support mold growth. In addition, various building materials or components may provide nourishment for mold growth. [FN122] Water, therefore, is the key growth factor in the structural setting. [FN123] Uncontained water should not be found in a structure under normal conditions. [FN124] Thus, the presence of water is usually a focus of mold assessment, remediation, and prevention activities. Nevertheless, it is important to consider each of the conditions that must be present in a structure to facilitate mold growth.

a. Temperature

Mold growth will only occur within a certain temperature range. Many species require a temperature between forty and 100 degrees Fahrenheit. [FN125] The temperature maintained for structure occupants' comfort is obviously well within this growth range.

b. Water

The presence of significant amounts of mold in a structure requires a proximate source of water, [FN126] but the water does not necessarily have to be pooled or standing. [FN127] Growth can occur ***316** when the relevant surface has absorbed water or when there is sufficient humidity. [FN128] Some molds need greater amounts of water than others. [FN129]

The potential sources of uncontained water in a structure are varied. [FN130] They may be either internal or external. [FN131] Internal leaks or other releases of water are common. [FN132] Older buildings may be particularly susceptible to leaks from faulty plumbing or other related structural deterioration. [FN133]

Water can also infiltrate a structure. [FN134] This may occur because of flooding [FN135] or other lateral movement of water. [FN136] Also ***317** relevant are excess rainfall [FN137] or sub-surface water intersecting the structure. [FN138] Water may also enter the building through structural flaws associated with doors, [FN139] roofs, walls, windows, [FN140] or other parts [FN141] of the building. [FN142]

The relative humidity in a structure may affect mold growth. [FN143] The organisms generally prefer higher humidity. [FN144] Increased humidity levels in structures have been cited as a growth factor in the indoor environment. [FN145]

c. Food

Structural mold will use a variety of building materials for nourishment. [FN146] Wallboard, ceiling tiles, wood studs, and other cellulose rich material will support mold growth if sufficient moisture is present. Mold may also be found on structural surfaces such as carpets or HVAC systems. [FN147] The development of ***318** building materials that resist mold growth is therefore of interest. [FN148]

3. Health Effects

The pervasive presence of mold in our environment means that we are repeatedly exposed to these organisms. [FN149] Fortunately, most of the population has developed tolerances that under normal circumstances enable them to avoid more severe adverse effects. [FN150] Nevertheless, a measurable percentage is physically affected to some degree by mold and other biological contaminants. [FN151] These effects may take the form of allergies or infections. [FN152] Individuals particularly affected by mold spores [FN153] may be denominated "hypersensitive." [FN154]

Some molds produce mycotoxins. [FN155] The type of associated toxins will vary with the species. [FN156] Therefore, the potential ***319** health effects associated with exposure to a particular mold can depend on the species. [FN157] The effect of these toxins on human health is a subject of some disagreement. [FN158] Regardless, there is significant interest in the potential health effects associated with one or more of these toxins.

The potential impact of structural mold on the occupants is particularly relevant. There is a divergence of opinions as to whether exposure to mold in structures can cause certain serious health effects. [FN159] Establishing human health effects is complicated by the fact that there are thousands of species of mold, and individuals have different sensitivities to the organisms. Further, health effects will vary with the type of mold [FN160] and whether structure occupants have been exposed to it. The mold or its spores must be released into the air and inhaled, ingested, or dermally absorbed. [FN161] These and related issues will likely continue to be a source of conflict in the litigation, [FN162] regulatory, and transactional contexts.

III. ADDRESSING STRUCTURAL MOLD

The parties addressing mold in the improved real property transactional context will probably consider at least three questions. They include (1) whether water has or can penetrate the ***320** shell of the structure in a manner facilitating the amplification of mold growth; (2) whether abnormal or non- de minimis quantities of mold are growing in the structure producing types or quantifiable amounts of spores not found in the outside ambient air; and (3) whether the mold species present in the structure are believed to potentially adversely affect human health and are present in quantities or concentrations sufficient to do so. The institutionalization of understandable cost-effective processes or procedures to address these questions will be critical.

A. Assessment of Mold in the Transactional Context

Environmental assessments have been used for years by parties seeking to identify and/or quantify such issues in the transactional context. [FN163] The perceived presence of some contaminants or conditions in a structure will put in play the possibility that remediation expenditures may need to be incurred. There will often be uncertainty as to the potential costs associated with the structural mold until the scope of their presence is defined. The delineation of the contamination will reduce this uncertainty. [FN164]

Most initial environmental assessments of real property are undertaken in accordance with somewhat similar procedures or protocols. [FN165] The various parties to such transactions generally understand and accept the components of the assessment process. This acceptance is probably a function of the standardization ***321** of the procedures, experience, and desire to attain certain governmental requirements. [FN166]

There is arguably less standardization or uniformity associated with mold sampling protocols, inspection strategies, or remediation measures. [FN167] This is due, at least in part, to mold's much more recent appearance as a potential transactional environmental impairment. Fewer real property personnel or parties have had significant experience with these activities or techniques. Further, there are no mandatory government standards addressing mold assessment or remediation.

The real property market's unfamiliarity with mold and associated management measures increases the possibility that the organisms will constitute an impediment in some transactions. This has stimulated interest in the standardization and refinement of mold management techniques. [FN168] The development of a degree of comfort with mold will be dependent upon the availability of generally accepted management measures that can quantify and/or otherwise address the issue in a cost-effective manner. Unfortunately, from a transactional perspective, mold has characteristics that may make it a greater challenge to assess or quantify than many environmental issues.

***322** 1. Assessment Issues

a. Living Organisms

Mold literally consists of living organisms. Almost any structure can support mold growth if the appropriate conditions are present. As a result, a property cleared by an assessment prior to closing could subsequently develop or redevelop a problem. This distinguishes mold from almost every other environmental condition. For example, an environmental assessment may determine that friable asbestos or an underground heating oil tank is present. Once the material or tank is removed, the likelihood the issue will arise again is presumably remote. [FN169] This is not necessarily true for mold.

Since mold is a living organism, human activity [FN170]or intervention need not occur for it to occupy or reoccupy a facility. [FN171] This has ramifications for the assessment/remediation process, because the successful assessment and/or remediation of a structure does not mean mold growth will not reoccur. [FN172]

Equally important, seemingly innocuous conditions such as drips or leaks may, in certain scenarios, facilitate mold growth. Therefore, the permanent elimination of mold in a structure requires that the conditions facilitating such growth be addressed. ***323**[FN173] As a result, the assessment must identify relevant structure maintenance or design problems. Their correction will probably be necessary to prevent a reoccurrence.

b. Absence of Regulatory/Action Standards

There is almost a complete absence of regulatory requirements applicable to mold. [FN174] Consequently, there is a concurrent lack of mandatory, bright-line governmental remediation standards or permissible exposure limits [FN175] for mold. [FN176] These standards would be used to determine or measure success in achieving "acceptable" levels of mold. [FN177]

In contrast, standards or limits have been set for many activities or other problematic substances potentially encountered at various facilities. [FN178] Government agencies frequently promulgate ***324** these standards pursuant to a rule or through the issuance of a policy. Examples of such standards might include benzene groundwater action levels, polychlorinated biphenyl soil cleanliness standards, [FN179] or a crumble test for friable asbestos. [FN180]

Action or cleanup standards can play an important role in addressing environmental issues in the transactional process. [FN181] These benchmarks may be employed to determine the level of environmental and health protection needed to be achieved by remediation or cleanup efforts. [FN182] Consequently, parties in some ***325** transactions may use them to determine the acceptability of environmental conditions at a particular property. They may also play a role in the litigation of disputes involving the presence of certain substances. [FN183]

The absence of analogous mold standards poses a problem. Many non-natural environmental contaminants are compared to a zero "benchmark." [FN184] A party generating mold sampling data may not have benchmarks to evaluate the "acceptability" of the results. [FN185] Such simplistic comparisons are difficult for mold since those types of organisms are normally present on a structure surface and in the air of even relatively clean buildings. [FN186]

c. Establishment of a Baseline

The baseline for comparison of data may be the difference between the sampling results from the structure and the adjacent outdoor environment. [FN187] However, there may not be a consensus as to the types and/or concentrations of molds which constitute a potential threat in the indoor environment. Further, designing ***326** the sampling program needed to make such comparisons can be a complex exercise. There may be disagreements or confusion in determining what constitutes problematic types or amounts of mold and associated spores in a particular structure. Also important, the presence of an abnormal amount or types of molds, does not necessarily mean there is a threat to the occupants' health. [FN188]

d. Detection Difficulties

A key component of initial routine environmental assessments has been a visual inspection of the structure or real property. [FN189] Invasive inspection efforts or the sampling of structure air may be necessary if mold is suspected in these areas. A search for mold would also likely include a visual inspection of the structure. Therefore, the initial assessment of a structure will probably focus on the identification of either abnormal mold growth or the conditions that facilitate it. However, a visual inspection will not always identify all problematic concentrations of mold in a structure. The organisms may grow in portions of the structure in which visual inspection is difficult.

e. Interpreting/Understanding Assessment Results

The combination of uncertainty as to the roster of problem molds and absence of bright-line action levels or standards makes it more difficult to reach definitive conclusions about assessment results. This can be a transactional impediment since the purpose of the assessment is to make a determination as to the "acceptability" of a particular condition. The absence of objective criteria turns the process into a more subjective determination. The inability to easily quantify an environmental issue may tend to magnify its importance in the transactional context.

***327** f. Common-Law Damage Actions

The presence of mold in structures is generating a significant number of third-party damage claims. [FN190] These common-law claims often allege property damage and/or bodily injuries. The resolution of these claims tends to be complicated by the previously noted absence of standards or permissible exposure limits. As a result, the potential financial impact associated with these claims tends to be difficult to quantify with any certainty.

2. Assessment Tasks

Most parties involved in the transfer, financing, or construction of commercial, industrial, or multi-family residential facilities have in place systematic procedures to identify and quantify to some extent environmental conditions prior to consummation of the transaction. [FN191] The initial assessment procedures utilized in many transactions are found in two American Society of Testing Materials ("ASTM") standards. [FN192]

The two standards are known as the Transaction Screen Process (E-1528) and the Standard Practice for Environmental Site Assessments: Phase I [FN193] Environmental Site Assessment Process (E-1527). [FN194] These activities include site inspections, ***328** database searches, and/or a review of current/historic uses. [FN195] The two ASTM environmental assessment standards do not encompass sampling or testing. [FN196]

Initial transactional environmental assessments have rarely included a search for mold. [FN197] Therefore, the party interested in assessing whether objectionable types or concentrations of mold are present has two options. The traditional transactional due diligence efforts can be expanded to address mold [FN198] or, in the alternative, a separate mold assessment can be undertaken.

Various testing and/or assessment techniques are used to determine whether mold is present in a structure. There is no "standard" protocol or approach for mold sampling or assessment. [FN199] Further, new tests/methods have been and will continue to be developed because of the heightened interest in mold. However, it is unlikely that most initial assessments of a structure in the transactional context will involve actual sampling or invasive testing. [FN200] Instead, some type of initial screening analysis is more likely.

A consensus or generally accepted mold screening protocol does not currently exist. The absence of "standard" initial assessment protocols poses two problems. First, parties seeking to incorporate mold issues into transactional due diligence procedures must determine which tests or assessment methods should be utilized. This can be a complicated question. The ultimate decision will presumably be based on the ability of the test or method to delineate and/or quantify the presence of mold at a cost deemed reasonable by the various parties to the transaction. Second, the absence of a standard format or protocol for the improved real property market can lead to varied findings. [FN201]

***329** An ASTM committee has announced its intention to develop a standard questionnaire for mold screening. [FN202] The questionnaire would establish standard protocols for the visual inspection of mold structures. [FN203] The scope of the committee's task is described as to "define good commercial practice for conducting a transactional screen of a commercial building with respect to the presence of readily observable mold." [FN204] The intent of the protocol is stated to be to allow the user to assess the potential need for further assessment or action beyond what is identified in the standard. [FN205]

The initial screening activities may suggest the need for some type of sampling effort. [FN206] The overall objectives of mold assessment work would likely be two-fold. The first objective would be the delineation of the location of non- de minimis amounts of mold. The second would be to determine if conditions are present in the structure which could facilitate mold growth. [FN207] Each of these two tasks/objectives would probably be addressed by mold due diligence procedures.

Mold testing/assessment techniques might be divided into roughly three categories. They include visual inspection, *330 bulk/surface sampling, and air monitoring. These techniques may be employed individually or in conjunction with each other, depending upon the transactional objectives.

a. Visual Inspection

A visual inspection will include a visual search for signs of mold growth. [FN208] The presence of mold may be evident because of discoloration [FN209] of building or other materials. [FN210] The scope of the visual inspection can vary. For example, some potentially affected areas may not be easily accessible. The organisms may be found in crawl spaces, inside walls, and in other interior structural spaces. [FN211] Invasive efforts may be needed to inspect these areas. This may involve the piercing or destruction of walls or other portions of a structure. [FN212] Therefore, visual inspections might be categorized based on whether or not they are invasive. [FN213]

*331 The typical visual inspection will probably not be limited to the identification of mold itself. It will also include the conditions that facilitate mold growth. These could encompass evidence of flooding (or other water intrusion), drips, leakage, HVAC [FN214] problems, and water-damaged materials. Whether such conditions are historical in nature and have been corrected or will continue to produce moisture will be important questions. [FN215]

b. Sampling

Mold may not be identified or located in an initial assessment. However, there may be suspicions in some instances that problematic concentrations are present in less accessible portions of the structure. If so, sampling techniques may be used to determine if is necessary to search for significant growth. The techniques may include a mixture of air and bulk sampling for visible fungi. [FN216]

i. Air

A visual inspection may not always provide the information needed to answer certain questions about the fungi conditions in the structure. Sampling activities may be necessary in certain circumstances to generate data to address these questions. The objective of any sampling effort should be to obtain results that are representative of the conditions present in the structure. This goal will dictate the sampling method and number of samples that are utilized. The same data quantity and quality control issues*332 associated with other types of environmental sampling also apply to mold. [FN217]

Mold is normally found in a structure's air. Airborne culturable fungi and total fungal spore concentrations may be sampled in a structure's air. [FN218] The purpose of such sampling will be to determine if atypical types or concentrations/amounts [FN219] are present. [FN220] Such results may be an indication that abnormal or non-baseline amounts of mold are present.

Air sampling may be undertaken for various reasons. It might be deemed necessary if it is suspected a visual inspection missed on-site mold. This might occur if mold is in an inaccessible area of the structure. Further, an assessment of the collected spores may help determine the type of the mold present or its location. [FN221] The results of such sampling may help determine whether invasive sampling is justified.

Air sampling might also be considered if the structure has a history of credible occupant complaints regarding indoor air *333 quality concerns. [FN222] Undertaking such sampling subsequent to a visual inspection may definitively determine whether there is (or is not) a problem. There may also be interest in sampling the air inside severely contaminated structures after remediation. Such samples may be used to determine if mold spores are below baseline levels. The results may help determine whether the remediation was successful.

Air sampling results are usually viewed with some caution. Certain molds do not become airborne unless disturbed. [FN223] Equally important, a discrete air sample is literally a snapshot of the concentration of specific spores in the air in that location at a particular point in time. [FN224] In other words, the amount of mold spores suspended in the air during the course of the day can fluctuate. [FN225] Mold concentrations can also vary on a seasonal basis. [FN226] Consequently, sampling results from a particular point in time may not be representative of structure conditions.

Mold spores are naturally found in the outside environment. [FN227] Consequently, indoor air sampling results are usually evaluated in conjunction with background ambient air conditions [FN228] in the vicinity of the subject structure. [FN229] The sampling *334 protocol would presumably need to specify that outside ambient air conditions will be simultaneously delineated. [FN230] Because the amount or concentration of mold and associated spores in the environment is constantly

changing, multiple samples may need to be undertaken to properly characterize the baseline measurement. The objective is to provide a reference point or baseline for comparing inside and outside conditions.

The outdoor ambient air baseline and indoor conditions may be evaluated in various ways. For example, the aggregate amount or concentration of mold spores may be compared. [FN231] Likewise, the uniformity of the types [FN232] and amount of mold in the outdoor and indoor environments may be assessed. [FN233] An outdoor baseline will normally contain a mixture of various species of mold spores. There will be a qualitatively similar diversity of airborne mold spores in the indoor and outdoor air. The predominance of a particular species in an indoor sample may indicate abnormal colony growth in the structure. [FN234]

***335** ii. Bulk/Surface

The identification of more than de minimis [FN235] mold in a structure during the visual inspection may be a confirmation that there are potentially objectionable conditions present. However, the parties should still determine whether such a result constitutes a material issue in the context of a particular transaction. Bulk [FN236] and surface sampling would likely be undertaken to more definitively delineate impacted areas and/or the type of organisms present. [FN237] These sampling methods may be used to determine whether contamination is present on various building materials. The techniques could involve the extraction of spores, wiping or swabbing, or vacuuming.

The parties involved in a transactional assessment will often respond to identified environmental conditions by cooperating in addressing the problem. Specifically, the parties to the transaction could work to eliminate both the objectionable types or amounts of mold and conditions facilitating its growth. Bulk or surface sampling may be used to determine the cost and method of remediation. It might also be used to confirm successful completion of remediation of affected areas.

B. Remediation

The removal of structural mold is a wasted effort unless the conditions that facilitated its growth are addressed. Nevertheless, perceived problematic amounts of mold may be identified and targeted for remediation The objective in remediating mold ***336** and its spores is not to sterilize the structure. Mold is naturally found in both the indoor and outdoor environments. [FN238] This makes the removal of all mold or its spores a practical impossibility. [FN239]

1. Methods

The goal of mold remediation has been described as the removal or cleaning of contaminated materials in a way that prevents the emission of fungi and dust contaminated with fungi from leaving a work area and impacting and entering an occupied area. [FN240] The remediation of some structurally sound materials may involve various cleaning methods. [FN241] The removal method may often simply include the use of detergent solutions. [FN242] Some porous materials may be contaminated to such an extent they cannot be cleaned. [FN243] The level of expertise and personnel protection to perform remediation may vary with the size of the affected area. [FN244]

The removal of problematic concentrations of structural mold cannot be cost-effectively accomplished in some instances. The destruction of portions of a structure has sometimes been undertaken to ensure the permanent elimination of mold in a particular part of the building. [FN245] Whole structures have even apparently been destroyed in a few instances to address the presence of mold. [FN246]

***337** 2. Standards/Exposure Limits

The vacuum of governmental benchmarks addressing mold has not been filled by standards recommended or issued by private organizations. [FN247] Some organizations have policies or recommended practices of some sort related to mold [FN248] or the conditions that facilitate its growth.

C. Prevention

The expense associated with the prevention of an environmental problem is typically less than the cost to correct it. Mold is no different. [FN249] The conditions necessary for growth will be present in a structure occupied by significant amounts of mold. Thus, the elimination or prevention of one or more of these growth conditions may better ensure the absence of abnormal types or amounts of mold in a structure. The failure to do so means growth could reoccur.

The prevention of the conditions that facilitate mold growth may be addressed to a great extent by various existing maintenance/operational practices and/or active fungal control systems. Also relevant are a number of standards/specifications applicable to the structure and/or material/equipment components. Maintenance/design provisions may be implemented through industry codes and/or enforceable governmental standards.

***338** 1. Maintenance/Operational Practices

Mold prevention includes the employment of proper maintenance/operational practices. Such practices are not necessarily exotic or complicated. [FN250] They may encompass fairly simple practices or equipment such as: (a) operating the HVAC system the appropriate amount of time and within a certain temperature range; [FN251] (b) cleaning and maintenance of HVAC systems; [FN252] (c) use and maintenance of adequate ventilation in homes and other structures; [FN253] and (d) inspection and maintenance of the components of the structure envelope. [FN254]

2. Building/Equipment/Material Specifications

Better adherence to relevant building, equipment, and material standards is increasingly viewed as important in the prevention of objectionable mold growth. [FN255] The standards may be a part of industry recommended practices or local [FN256] or state controls.

***339** The interest in mold growth and the indoor environment has been reflected in some recent building, equipment, and material standards. These standards have ranged from the optimum method for integration of windows/doors into the structure [FN257] to the improvement of building materials such as gypsum [FN258] and drywall. [FN259] There is also interest in HVAC and related equipment. [FN260] These standards may be driven to some extent by research into the environmental conditions inside a structure and methods or practices to improve them. [FN261]

3. Active Systems

Eliminating both growth conditions and objectionable mold colonies are the primary means of addressing the aggregate effect of the organisms. [FN262] However, active systems have also been developed to address mold and other indoor air pollutants. A relatively recent example is the employment of ultraviolet light fixtures to reduce fungal contamination in air handling units. [FN263]

***340** Not all active systems are of recent vintage. Some systems have been used for years. [FN264] For example, air filtration systems have, to some extent, addressed indoor air quality. [FN265] These might include electronic air cleaners used to remove airborne particles and collect them on electronically grounded plates. [FN266]

Filtration has not been used extensively to improve indoor air quality in commercial buildings. [FN267] This supposed disinterest has been stated to be derived from confusion concerning filtration performance, absence of clear filter test standards, and a failure to consider the life cycle costs of filtration. [FN268] However, the role of filtration may increase as new techniques become available. [FN269]

IV. CURRENT/PROPOSED GOVERNMENTAL PROGRAMS/REQUIREMENTS

Governmental standards can play an important role in the allocation of the risks or responsibilities associated with potential environmental concerns in a given transaction. [FN270] Federal, state, and/or local [FN271] environmental regulations or requirements are often cited or incorporated by reference in transactional documents. [FN272] The standards may be placed in or referenced by certain warranties, covenants, indemnities, and other provisions used in transactional documents to address environmental issues. [FN273] They may be used to delineate whether a warrant/covenant has been violated, or an indemnity is applicable. [FN274]

***341** Neither the federal nor the state governments have developed mandatory standards applicable to the presence of mold in structures. Instead, the governmental efforts have focused on research and guidance, although unsuccessful steps were taken to enact federal mold legislation in 2002. [FN275] However, legislative activity focused on mold in various states has arguably heightened interest in the issue.

A. Federal

Legislation was introduced in the 107th Congress that would have focused the Federal Government on mold issues for the first time. The Toxic Mold Safety and Protection Act of 2002 ("Act") [FN276] would have tasked certain federal agencies

with conducting research on the impact of mold on human health. It would have also required the development of guidelines for the investigation and remediation of mold.

The Act's language directed the Centers for Disease Control ("CDC"), the EPA, and the National Institute of Health ("NIH") to perform a comprehensive study of the health effects of indoor mold. [FN277] The EPA would then set standards in accordance with the studies. [FN278] They would include standards for mold inspection and remediation, certification of mold inspectors and remediators, and for air ventilation and/or air-conditioning systems. [FN279] The Department of Housing and Urban Development ("HUD") would have then been required to establish guidelines identifying construction conditions that contribute to indoor mold growth, and to recommend means for eliminating these conditions. [FN280]

The Act would have imposed specific obligations on certain property owners. Owners of rental property would be required to perform annual inspections in accordance with set ***342** standards and to notify the occupants of the property of the inspection results. [FN281] The Secretary of HUD and the Administrator of the EPA would then have been directed to promulgate regulations for the disclosure of mold hazards in housing which is offered for sale or lease. [FN282] These regulations would require that a house be inspected for mold before it is sold or leased, and that the results of the inspection be clearly and accurately disclosed to the purchaser or lessee. [FN283]

Inspection requirements for public housing would also have been established by the Act. [FN284] HUD would have been required to promulgate procedures to eliminate the hazards of indoor mold in existing public housing. [FN285] The agency was also charged by the Act with setting and imposing standards ensuring that new public housing is built in compliance with the standards set forth in the Act. [FN286]

The Act would have further imposed new obligations on federal agencies that provide financial assistance for residential properties by requiring the performance of an indoor/toxic mold inspection prior to any federal agency making, insuring, or guaranteeing a mortgage or loan for residential properties. [FN287] It included an amendment to the National Cooperative Research and Production Act of 1993. [FN288] Also addressed were standards for building products designed to retard the development of mold. [FN289] The EPA was directed to provide grants to state and local governments to cover the costs of remediating mold growth in government buildings. [FN290]

The Federal Emergency Management Agency ("FEMA") would have been required by the Act to establish and carry out a ***343** national toxic mold insurance program. [FN291] Residential properties designed for one to four families would have been given priority in the program. [FN292] The agency would also have been required to establish a National Toxic Mold Hazard Insurance Fund in the United States Treasury. [FN293]

Some aspects of this proposed federal legislation have been criticized. There has been a particular concern about the provision requiring the establishment of minimum levels of exposure to mold. The opponents argued that additional research is needed to address the scientific uncertainties associated with the health effects of mold. [FN294] The challenge of setting standards that take into account individual sensitivities to mold has been cited as a practical impediment to this requirement. [FN295]

B. State

California became the first state to enact comprehensive mold legislation [FN296] when the Toxic Mold Protection Act was signed into law in October of 2001. [FN297] The California legislation required the Department of Health Services to form a task force to aid [FN298] it in creating statewide mold standards. [FN299] The task force must research and develop permissible mold exposure levels. [FN300] The California law also requires that property owners disclose the known presence of mold to potential or current residents if the mold is in excess of the standards that are eventually developed. [FN301] The State enacted a second law requiring the ***344** California Department of Health to develop programs for the education and training of mold-related issues. [FN302]

Several other states have considered or enacted toxic mold legislation, [FN303] including Indiana, New York, Maryland, [FN304] and New Jersey. [FN305] Legislation considered by Indiana provides an example of a state's efforts to address mold in a less comprehensive [FN306] manner than California. The legislation would have directed the State's Department of Health to convene a task force to advise it on the development of toxic mold standards. [FN307] It also would have directed the Department to develop recommendations for indoor mold exposure limits. [FN308] The facilities for which